

PRELIMINARY DATA SUMMARY

January 1988

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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CERC Field Research Facility
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility (FRF) in Duck, North Carolina. The FRF staff collected and analyzed these data. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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PART I: INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC's) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Figure 1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The research pier is a reinforced concrete structure supported on 0.9-m-diam steel piles spaced 12.2 m apart along the pier's length and 4.6 m apart across the width. The pier deck is 6.1 m wide and extends from behind the duneline to about the 6-m water depth contour at a height 7.6 m above the National Geodetic Vertical Datum (NGVD). In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Questions and/or comments concerning the data may be directed to Mr. Herman C. Miller at (919) 261-3511.

Part II presents the meteorological data; Parts III through VI present oceanographic data; Part VII presents nearshore profiles and bathymetry; and Part VIII, if included, documents special events that occurred at the FRF during the month.

Table 1 is a list of instruments used, their operational status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depths at the wave gages and current meters vary and may be determined from information contained in Figure 7. Other installation information is contained in Table 1.

Times given in the report, unless otherwise specified, are referenced to eastern standard time (EST).

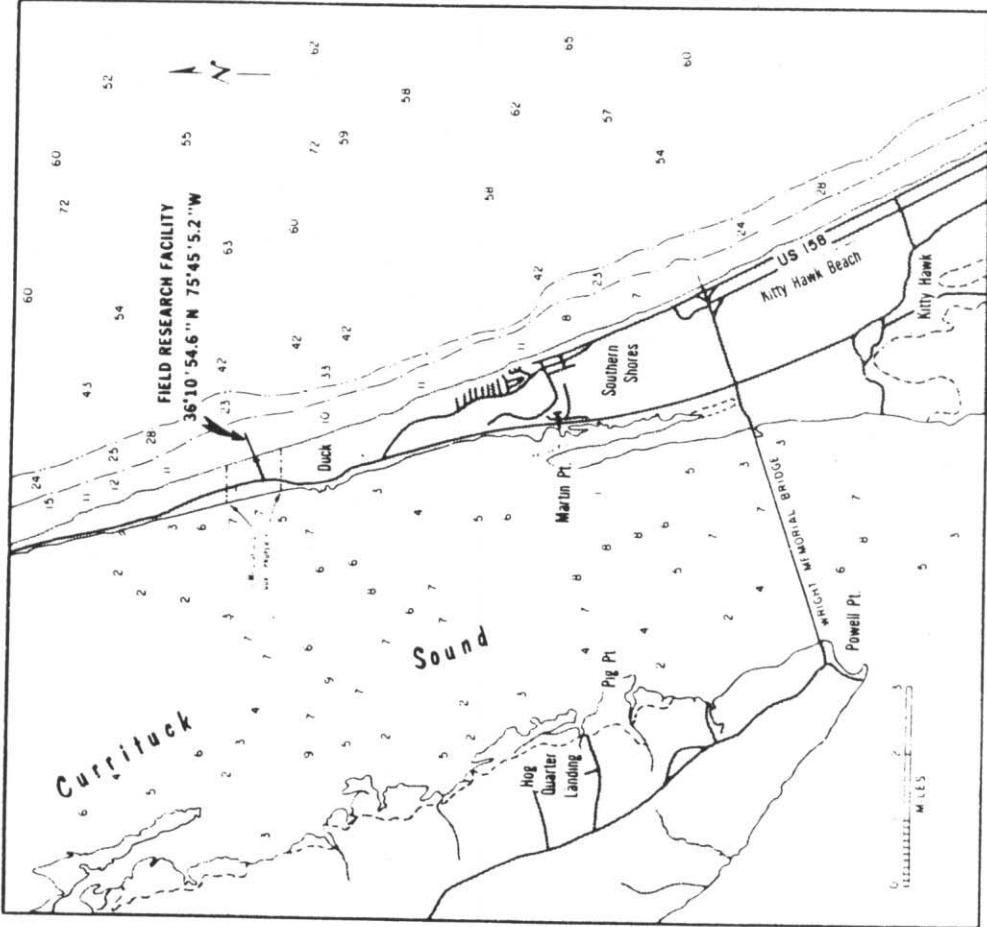
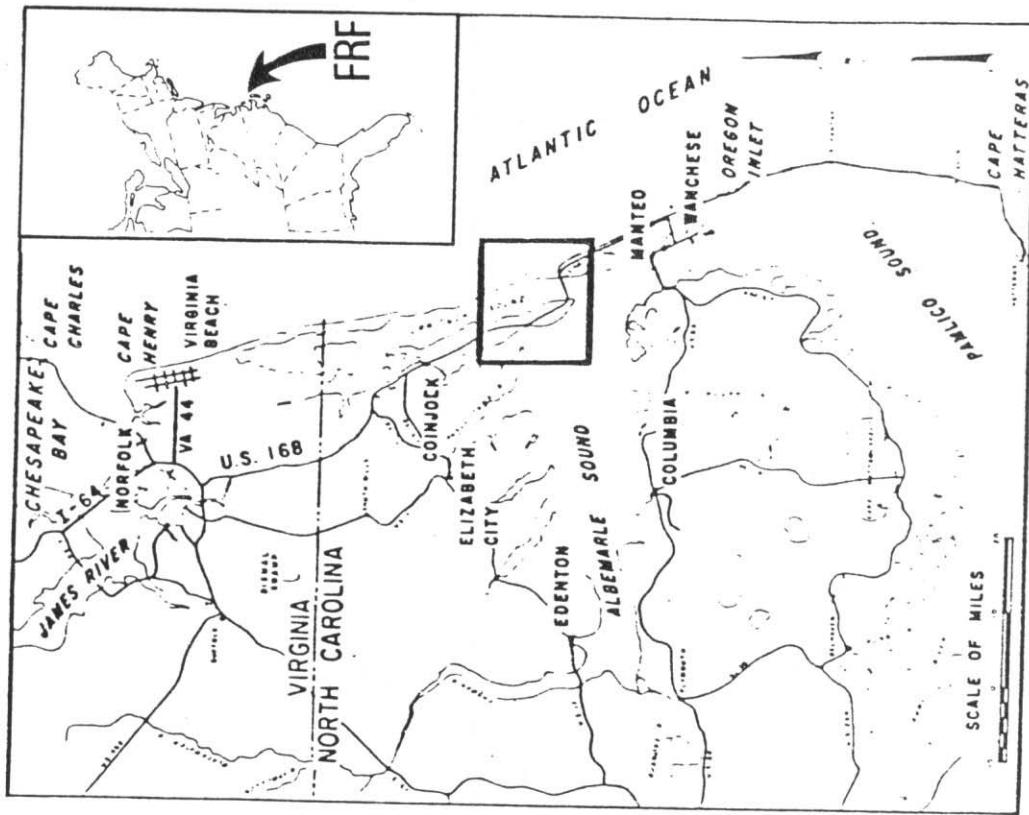


Figure 1. FRF location map

TABLE 1: INSTRUMENT STATUS/DATA AVAILABILITY

JAN 1988

Gage ID	Description/Remarks	Depth at Sensor	Day of the month																																	
			1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1			
616	Barometric Pressure		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Analog Record	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
604	Precipitation		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
624	Air Temperature		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
632	Anemometer on Laboratory Building Elevation 19 m (NGVD)		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Analog Record	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
645	Baylor staff at station 7+80 on FRF pier	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
625	Baylor staff at station 19+00 on FRF pier	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
111	Pressure gage 309 m north of FRF pier (0.9 km offshore)	Approx. 7.8 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
630	Waverider buoy 6.0 km offshore	Approx. 23 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
679	Current meter 500 m south of FRF pier (0.5 km offshore)	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
865-1370	NOAA tide station at seaward end of FRF pier		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Supplemental Observations (daily oceanographic and meteorological observations)		Daily observation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Gage Status Daily Observation Analog Record Data Collected
 Operational = * Complete = * Complete = * All = *
 Partial = / Partial = / Partial = / Partial = /
 Non-Operational = - None = - None = - None = -

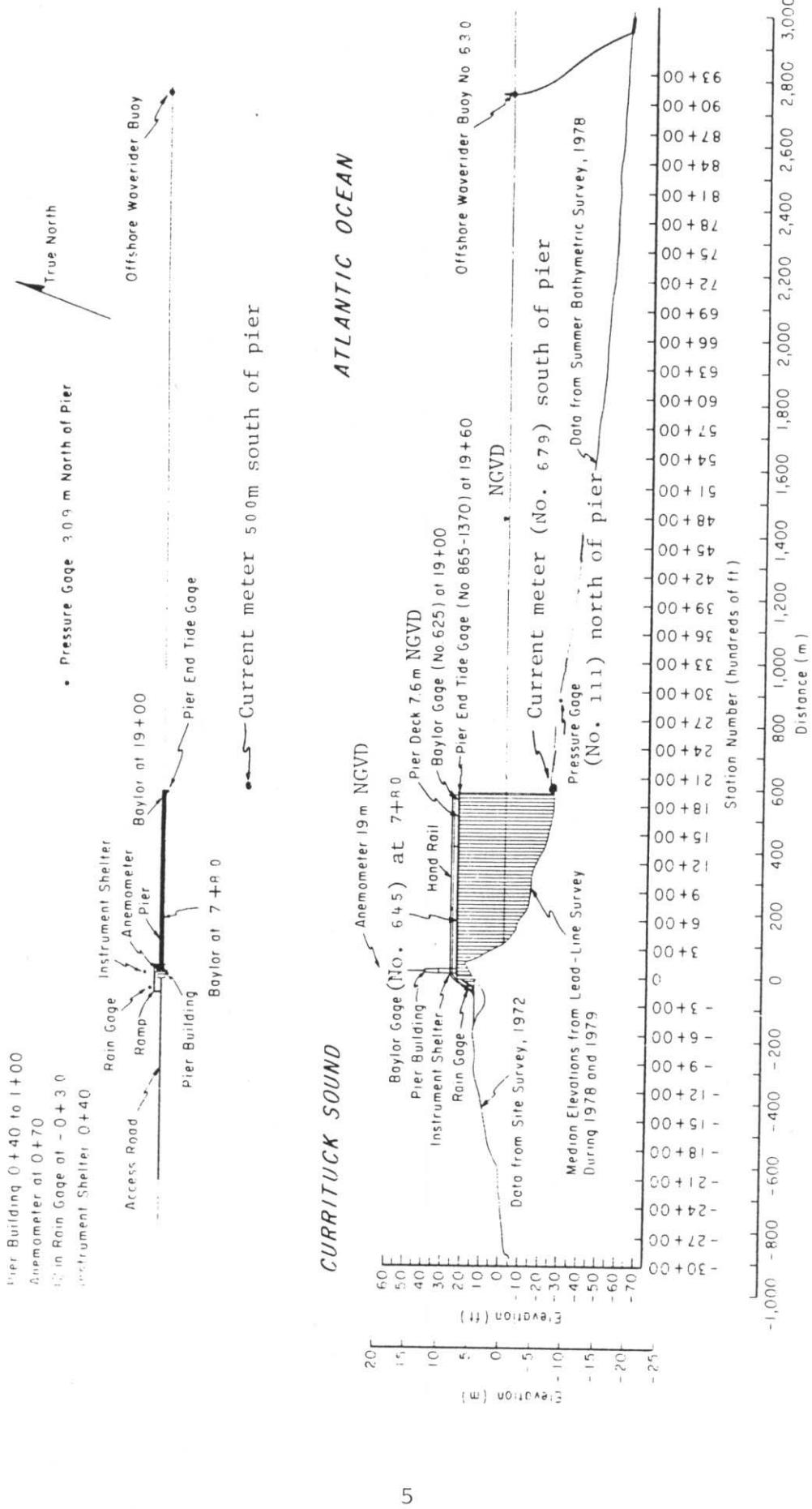


Figure 2. Instrument locations at FRF

PART II: METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Figure 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Digital Equipment Corporation VAX 11/750. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

Winds were measured on top of the laboratory building at an elevation of 19 m (Figure 2) using a Weather Measure Skyvane anemometer.

Monthly resultant wind speeds and directions are determined by vector averaging the data. Temperature and atmospheric means are the average of the values presented for the month. Total precipitation is the sum for the month.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
 $mm \times .03937 = in$
2. Millibars (mb) to inches of mercury (in Hg) -
 $mb \times 0.02953 = in Hg$
3. Degrees Celsius (C) to degrees Fahrenheit (F) -
 $(C \times 9/5) + 32 = F$
4. Meters per second (m/s) to knots (kn) -
 $m/s \times 1.943 = kn$

Table 2: Meteorological Data

JAN 1988

Day	Hour	Wind	Wind	Temperature	Atm	Precipitation
		Speed m/sec	Direction deg TN	deg C	Pressure mb	mm
1	100	5	192	10.8	1027.0	0
	700	7	200	12.5	1025.3	0
	1300	4	231	16.2	1023.6	0
	1900	1	111	12.1	1024.3	0
2	100	11	26	8.3	1026.3	0
	700	13	10	4.0	1031.4	0
	1300	10	25	4.3	1031.8	0
	1900	10	31	3.6	1033.5	0
3	100	9	38	3.8	1031.8	0
	700	11	42	4.7	1031.1	0
	1300	12	32	5.2	1026.3	5
	1900	14	14	6.6	1019.9	18
4	100	6	319	5.8	1015.2	4
	700	5	314	2.6	1017.5	0
	1300	5	262	4.8	1017.9	0
	1900	4	234	5.6	1018.6	0
5	100	8	294	3.7	1021.3	0
	700	6	305	-0.1	1026.3	0
	1300	5	302	1.0	1027.7	0
	1900	7	303	-1.0	1028.7	0
6	100	5	312	-3.1	1029.4	0
	700	7	326	-5.0	1032.1	0
	1300	6	318	-3.7	1032.4	0
	1900	4	327	-5.4	1034.1	0
7	100	6	320	-5.0	1034.1	0
	700	10	18	-2.7	1037.9	0
	1300	8	44	-0.7	1034.8	0
	1900	12	59	1.9	1029.7	0
8	100	16	56	4.7	1020.6	0
	700	10	332	6.2	1012.5	25
	1300	8	295	0.5	1013.1	0
	1900	6	279	-0.3	1016.9	0
9	100	6	295	-0.8	1019.2	0
	700	4	321	-1.3	1022.6	0
	1300	6	9	2.4	1024.0	0
	1900	7	12	1.5	1024.3	0
10	100	8	16	2.0	1023.6	0
	700	10	8	1.3	1027.4	0
	1300	10	355	1.2	1028.4	0
	1900	10	19	1.5	1030.1	0
11	100	9	37	3.6	1028.7	0
	700	10	37	5.4	1027.7	0
	1300	12	37	5.2	1025.3	0
	1900	11	19	4.5	1026.3	0
12	100	9	3	4.5	1025.7	0
	700	5	337	3.0	1026.7	0
	1300	5	348	5.8	1026.3	0
	1900	4	348	4.1	1024.7	0
13	100	4	189	2.8	1023.0	0
	700	4	209	3.2	1019.9	0
	1300	6	230	6.2	1016.5	0
	1900	3	291	4.4	1018.9	0
14	100	9	327	-1.2	1025.0	0
	700	17	351	-2.0	1031.1	0
	1300	13	7	-3.0	1033.5	0
	1900	8	18	-3.5	1036.2	0
15	100	7	30	-2.1	1033.5	0
	700	11	20	-0.1	1030.4	0
	1300	7	336	-0.8	1028.0	0
	1900	5	326	-1.5	1028.4	0
16	100	6	321	-2.6	1028.4	0
	700	5	342	1.1	1031.4	0
	1300	5	353	2.7	1031.1	0
	1900	2	318	-0.3	1031.4	0

(Continued)

(Sheet 1 of 2)

Table 2: Meteorological Data

JAN 1988

Day	Hour	Wind	Wind	Temperature	Atm	Precipitation
		Speed m/sec	Direction deg TN	deg C	mb	mm
17	100	2	302	-1.1	1030.4	0
	700	2	304	-0.5	1029.7	0
	1300	2	105	7.9	1026.3	0
	1900	3	49	5.6	1024.0	0
18	100	5	136	6.9	1019.9	0
	700	3	197	12.2	1017.5	5
	1300	5	252	10.5	1017.2	0
	1900	4	240	7.7	1017.9	0
19	100	3	248	4.4	1020.3	0
	700	5	20	4.3	1023.6	0
	1300	5	14	5.2	1023.3	0
	1900	5	32	5.6	1021.3	0
20	100	6	125	7.1	1015.5	0
	700	6	178	14.8	1013.1	0
	1300	6	184	17.3	1010.1	0
	1900	6	208	15.0	1009.4	5
21	100	5	212	13.5	1008.4	0
	700	2	222	10.9	1009.8	0
	1300	2	266	12.3	1009.1	0
	1900	2	80	6.8	1010.1	0
22	100	8	28	5.7	1010.1	0
	700	7	4	5.1	1014.2	0
	1300	9	354	4.6	1015.5	0
	1900	5	359	3.2	1017.2	0
23	100	3	167	2.9	1016.9	0
	700	2	196	2.7	1016.2	0
	1300	6	356	5.5	1014.8	0
	1900	3	147	2.8	1017.2	0
24	100	3	238	2.9	1019.2	0
	700	3	160	2.0	1020.9	0
	1300	3	189	9.8	1019.9	0
	1900	4	182	8.1	1019.6	0
25	100	2	219	6.6	1017.5	0
	700	3	109	5.1	1014.5	0
	1300	7	30	5.7	1005.7	0
	1900	6	320	4.9	1001.3	16
26	100	10	254	4.9	1005.0	0
	700	12	258	3.3	1011.1	0
	1300	11	258	2.6	1014.5	0
	1900	11	287	-1.7	1021.3	0
27	100	8	299	-4.2	1025.7	0
	700	4	305	-4.9	1028.7	0
	1300	4	2	0.1	1030.4	0
	1900	1	52	-1.2	1033.1	0
28	100	3	209	-2.1	1033.8	0
	700	5	280	-1.7	1035.5	0
	1300	4	31	1.8	1034.5	0
	1900	3	77	0.9	1035.2	0
29	100	1	217	-1.7	1036.5	0
	700	4	31	0.6	1038.5	0
	1300	3	84	4.9	1038.5	0
	1900	5	135	3.3	1036.2	0
30	100	4	150	3.9	1035.5	0
	700	5	199	6.4	1034.1	0
	1300	5	216	13.0	1032.1	0
	1900	5	193	10.2	1032.1	0
31	100	5	203	10.0	1032.1	0
	700	4	191	9.1	1032.8	0
	1300	5	184	17.8	1031.1	0
	1900	4	179	15.1	1030.1	0
		Resultant 3	349	Mean 3.9	Mean 1024.2	Total 78

(Sheet 2 of 2)

PART III: WAVE DATA

Wave data are collected from two Baylor staff gages (Gages 625 and 645), a pressure wave gage (Gage 111) and a Waverider buoy (Gage 630) as shown in Table 1 and Figure 2. The data are collected, analyzed, and stored on magnetic tape using a Digital Equipment Corporation VAX 11/750 programmed to sample the wave gages every 6 hrs (more frequently during storms) near 0100, 0700, 1300, and 1900 EST. The sampling rate is two times per second for 34 minutes.

Wave height H_{mo} is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. Wave height reported from the pressure gage has been compensated for hydrodynamic attenuation using linear wave theory. Wave period is identified from the computation of a variance (energy) spectrum with 60 deg of freedom calculated from a 34-min record. Peak wave period T_p is defined as the period associated with the maximum energy in the spectrum. When this analysis is complete, the data are written to magnetic tape.

Table 3 presents the wave heights and periods for each wave record obtained at 6 hr intervals during the month. The monthly means and standard deviations from the means shown in Table 3 are average values computed from this data. Figure 3 is a time history of all H_{mo} and T_p values obtained for all gages.

Differences in wave periods between wave gages (Table 3 and Figure 3) may be the result of wave breaking, wave reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA

JAN 1988

Day	Hour	645		625		111		630	
		Baylor	at 7+80	Baylor	at 19+00	Pressure Gage		Farshr	Wvrd
		Hmo,m	T.sec	Hmo,m	T.sec	Hmo,m	T.sec	Hmo,m	T.sec
1	0100	0.37	11.13	0.65	11.13	0.57	11.13	0.63	11.13
	0700	0.25	11.13	0.44	10.67	0.43	10.24	0.55	11.64
	1300	0.26	11.64	0.46	12.19	0.47	11.13	0.61	6.92
	1900	0.27	16.00	0.46	6.74	0.45	7.31	0.63	6.92
2	0100	0.85	3.94	0.95	3.88	0.98	4.00	1.09	4.13
	0700	1.38	5.57	1.55	5.69	1.46	5.69	1.92	5.45
	1300	1.14	5.82	1.45	6.09	1.33	6.09	1.66	5.95
	1900	1.10	5.57	1.20	6.56	1.18	5.95	1.39	6.24
3	0100	1.00	5.57	1.24	9.85	1.12	9.48	1.33	6.56
	0700	1.18	5.02	1.26	5.02	1.32	4.83	1.52	5.12
	1300	1.14	5.33	1.47	5.95	1.35	5.57	1.62	5.69
	1900	1.46	6.56	1.99	6.56	1.84	6.24	2.38	6.56
4	0100	1.33	7.11	1.89	7.53	1.83	7.11	2.26	7.31
	0700	1.08	6.24	1.34	7.76	1.17	7.53	1.76	6.92
	1300	0.87	8.83	1.15	9.48	1.07	8.53	1.29	7.76
	1900	0.64	9.14	0.93	7.76	0.76	8.26	0.99	8.00
5	0100	0.46	8.26	0.60	8.26	0.58	8.53	0.75	8.53
	0700	0.66	5.95	0.66	8.53	0.58	8.53	0.94	4.66
	1300	0.94	6.24	0.89	6.24	0.84	6.92	1.16	6.56
	1900	0.82	6.24	0.80	5.33	0.73	5.82	1.01	6.24
6	0100	0.71	5.22	0.71	5.02	0.66	5.12	0.84	5.45
	0700	1.00	5.02	1.04	4.83	0.99	4.83	1.25	5.33
	1300	1.20	6.40	1.13	6.92	1.17	6.74	1.44	6.40
	1900	0.87	5.82	0.85	6.24	0.74	6.24	1.05	6.40
7	0100	0.93	5.22	0.88	5.22	0.85	4.57	1.18	4.83
	0700	1.22	5.95	1.29	5.95	1.20	5.95	1.60	5.95
	1300	1.17	6.56	1.29	6.24	1.20	6.24	1.57	6.09
	1900	1.04	5.69	1.41	5.45	1.35	4.66	1.63	5.12
8	0100	1.04	6.92	2.30	6.40	2.03	6.92	2.64	6.74
	0700	1.38	8.26	2.66	7.76	2.41	7.76	3.13	8.00
	1300	1.25	7.11	1.73	10.24	1.65	9.85	2.17	9.85
	1900	1.15	7.76	1.51	9.48	1.32	9.85	1.70	9.14
9	0100	1.16	9.14	1.42	9.48	1.23	8.83	1.62	9.48
	0700	0.99	9.14	1.26	9.85	1.14	8.83	1.42	8.83
	1300	1.07	5.95	1.19	8.53	1.13	9.48	1.35	9.48
	1900	0.89	6.09	1.05	8.83	0.92	8.83	1.11	8.26
10	0100	0.81	6.09	0.89	8.53	0.81	8.83	1.02	8.26
	0700	1.05	4.92	1.20	5.02	1.02	4.92	1.65	5.12
	1300	1.06	5.22	1.14	5.57	1.11	5.57	1.45	5.69
	1900	1.03	5.02	1.15	5.45	1.05	5.57	1.20	5.22
11	0100	0.95	5.33	1.07	5.02	1.02	5.22	1.15	5.22
	0700	0.99	5.12	1.29	4.66	1.19	5.33	1.48	4.83
	1300	1.18	5.45	1.62	5.82	1.42	5.95	1.92	5.82
	1900	1.01	5.69	1.50	6.09	1.33	5.22	1.65	5.82
12	0100	1.04	5.22	1.49	6.74	1.38	6.40	1.69	7.31
	0700	0.92	8.83	1.46	7.31	1.26	7.76	1.61	7.11
	1300	0.84	9.48	1.36	8.53	1.30	8.83	1.63	9.48
	1900	0.90	10.67	1.45	10.24	1.35	9.85	1.62	10.24
13	0100	0.91	11.13	1.42	10.24	1.30	11.13	1.41	9.85
	0700	0.65	10.67	1.19	10.24	1.07	9.85	1.21	10.24
	1300	0.44	10.24	0.78	9.85	0.87	10.24	0.95	9.85
	1900	0.39	9.14	0.65	9.85	0.64	9.85	0.73	10.24
14	0100	1.45	6.92	1.70	6.74	1.65	6.56	2.31	6.56
	0700	1.35	7.31	2.49	7.11	2.58	6.92	3.12	7.53
	1300	1.43	7.11	2.08	6.92	2.00	6.40	2.33	7.11
	1900	1.14	8.00	1.56	8.83	1.42	7.53	1.75	8.00
15	0100	1.04	7.11	1.16	7.31	1.09	7.53	1.37	6.09
	0700	1.08	5.45	1.47	5.33	1.40	4.57	1.54	4.83
	1300	1.00	5.12	1.23	5.82	1.16	5.22	1.54	5.57
	1900	1.02	5.33	1.25	5.57	1.05	6.09	1.50	5.22
16	0100	0.84	5.02	1.11	5.69	1.07	5.45	1.31	5.82
	0700	0.93	5.12	1.11	8.26	1.07	9.85	1.24	9.48
	1300	1.02	5.69	1.24	9.85	1.07	9.48	1.38	9.85
	1900	0.71	10.24	1.13	10.24	0.99	9.48	1.22	9.85

* Electronic problems

(Continued)

(Sheet 1 of 2)

TABLE 3: WAVE DATA

JAN 1988

Day	Hour	645		625		111		630	
		Baylor at 7+80	Hmo,m T,sec	Baylor at 19+00	Hmo,m T,sec	Pressure Gage	Hmo,m T,sec	Farshr	Wvdr
17	0100	0.88	11.13	1.21	10.67	1.15	10.67	1.29	10.67
	0700	0.57	9.85	1.11	9.85	1.07	10.67	1.24	10.67
	1300	0.57	11.13	1.08	9.85	0.97	9.48	1.10	9.48
	1900	0.61	12.19	1.20	10.67	1.03	10.24	1.20	9.14
18	0100	0.99	12.80	1.54	12.19	1.51	11.64	1.59	11.64
	0700	1.19	14.22	1.90	13.47	1.63	12.80	1.77	13.47
	1300	1.10	13.47	1.78	13.47	1.67	13.47	1.81	12.80
	1900	0.85	12.19	1.32	12.19	1.31	12.80	1.54	12.80
19	0100	0.75	12.19	1.26	12.19	1.28	12.19	1.24	11.13
	0700	0.70	12.19	1.09	12.19	1.01	11.64	1.21	11.64
	1300	0.78	11.64	1.10	11.64	1.17	11.64	1.22	11.64
	1900	0.65	10.67	1.01	10.24	0.94	12.19	1.10	11.13
20	0100	0.61	11.64	0.96	10.67	0.96	11.64	1.16	12.19
	0700	0.79	12.19	1.07	11.64	1.05	11.64	1.29	11.64
	1300	0.50	12.19	0.92	11.64	0.85	11.64	1.17	11.64
	1900	0.51	11.13	0.79	11.13	0.78	11.13	1.02	11.13
21	0100	0.37	11.13	0.64	11.13	0.62	11.13	0.80	11.13
	0700	0.46	10.67	0.63	10.67	0.60	10.24	0.85	6.40
	1300	0.37	11.13	0.54	10.67	0.51	10.67	0.68	6.56
	1900	0.38	9.85	0.52	10.24	0.51	10.24	0.67	10.24
22	0100	0.50	2.88	0.67	10.67	0.48	3.28	0.80	7.11
	0700	1.12	5.57	1.35	5.69	1.21	5.45	1.57	5.45
	1300	1.03	6.09	1.31	6.24	1.12	6.40	1.63	5.95
	1900	0.72	5.95	0.99	6.09	0.88	5.95	1.10	5.69
23	0100	0.53	12.80	0.78	12.80	0.72	12.80	0.83	5.57
	0700	0.37	11.13	0.69	11.64	0.65	12.19	0.71	11.64
	1300	0.35	12.19	0.62	11.64	0.55	11.64	0.63	12.19
	1900	0.39	11.13	0.61	11.13	0.55	11.13	0.66	11.64
24	0100	0.29	11.13	0.49	11.64	0.52	11.13	0.57	11.64
	0700	0.32	11.13	0.52	11.13	0.54	11.64	0.61	11.13
	1300	0.33	11.64	0.47	12.19	0.48	11.13	0.53	11.64
	1900	0.28	11.64	0.43	11.64	0.42	10.24	0.54	10.67
25	0100	0.21	11.64	0.37	11.64	0.37	11.64	0.47	11.64
	0700	0.19	11.13	0.38	11.13	0.35	11.13	0.41	10.67
	1300	0.50	3.37	0.61	3.41	0.62	3.46	0.70	3.37
	1900	0.70	8.26	1.09	8.26	0.95	8.00	1.46	8.00
26	0100	0.43	6.92	0.59	7.31	0.64	7.11	0.90	7.11
	0700	0.31	5.69	0.44	5.69	0.43	9.14	0.85	5.95
	1300	0.28	6.40	0.40	7.76	0.41	8.00	0.84	2.81
	1900	0.41	2.81	0.49	9.14	0.43	9.14	0.81	9.48
27	0100	0.38	4.20	0.51	3.51	0.47	3.37	0.74	3.66
	0700	0.46	3.82	0.56	3.33	0.51	3.71	0.75	4.83
	1300	0.60	5.33	0.67	5.22	0.57	5.33	0.77	5.45
	1900	0.42	5.82	0.59	6.24	0.52	5.95	0.72	5.82
28	0100	0.44	5.57	0.52	5.69	0.47	5.69	0.62	6.40
	0700	0.29	17.07	0.42	16.00	0.42	16.00	0.45	16.00
	1300	0.45	15.06	0.57	15.06	0.51	16.00	0.57	15.06
	1900	0.33	15.06	0.48	15.06	0.47	15.06	0.49	15.06
29	0100	0.36	14.22	0.51	15.06	0.50	15.06	0.55	15.06
	0700	0.32	15.06	0.47	15.06	0.47	15.06	0.49	15.06
	1300	0.46	14.22	0.56	14.22	0.54	13.47	0.60	14.22
	1900	0.53	14.22	0.69	13.47	0.59	14.22	0.76	14.22
30	0100	0.36	14.22	0.57	13.47	0.51	13.47	0.63	14.22
	0700	0.26	14.22	0.39	13.47	0.35	13.47	0.44	13.47
	1300	0.17	13.47	0.31	13.47	0.29	13.47	0.36	13.47
	1900	0.20	14.22	0.29	13.47	0.27	13.47	0.38	13.47
31	0100	0.18	13.47	0.28	13.47	0.29	13.47	0.36	8.26
	0700	0.22	13.47	0.35	13.47	0.36	13.47	0.45	5.02
	1300	0.24	14.22	0.41	9.48	0.41	9.85	0.58	4.57
	1900	0.27	9.48	0.46	9.48	0.48	9.48	0.56	9.48
Mean		0.74	8.82	1.01	9.00	0.94	8.92	1.18	8.54
Std dev		0.35	3.43	0.48	3.04	0.45	3.09	0.55	3.08

* Electronic problems

(Sheet 2 of 2)

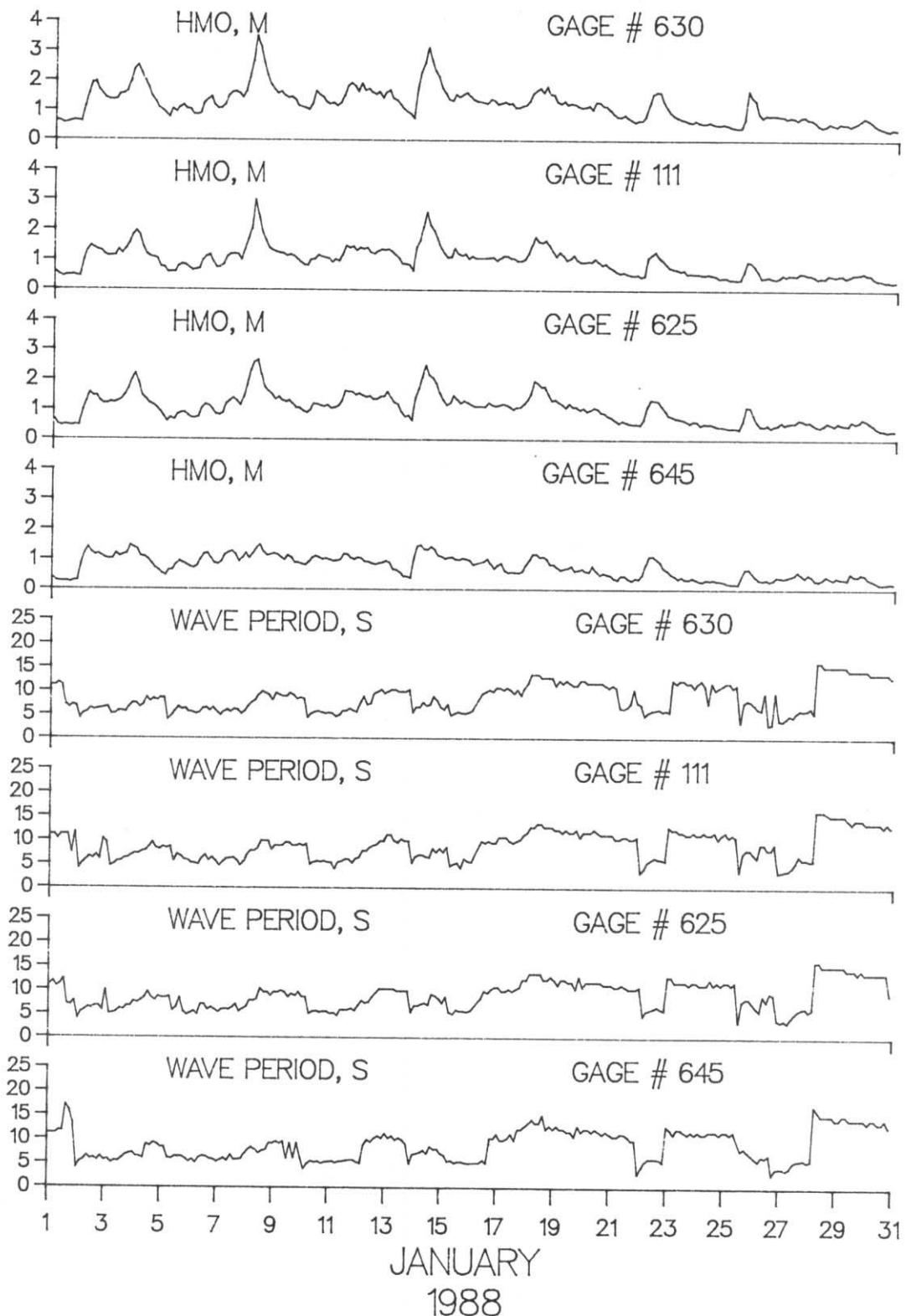


FIGURE 3. Time History of Wave Heights and Periods

PART IV: CURRENT DATA

Current data (Table 4) are collected from a Marsh-McBirney electromagnetic biaxial current meter (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, longshore currents flow either toward 340 deg (i.e. northward) or toward 160 deg (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second (cm/sec). Resultant speeds and directions are determined by vector averaging the data.

TABLE 4: Current Data
JAN 1988

Day	Pier Measurements						Beach Measurements (500m Updrift)			Current Meter at South Tripod		
	Alongshore Cross-shore Resultant		Dye at Mid-Surf Zone (surface)		Distance from Baseline (m)		Dye 12m offshore (surface)		Location	Speed	Dir	Depth -4.8m (NGVD) ID #679
Time	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	
1 0100-Along Cross Result										26	N	
1 0700-Along Cross Result	36	N			36	N				4	on	
	11	off	152		13	off				26	331	
	37	357			38	359						
1 1300-Along Cross Result									36	N		
1 1900-Along Cross Result										16	N	
										1	on	
										16	322	
2 0100-Along Cross Result										8	N	
2 0700-Along Cross Result	36	S			30	S				1	on	
	5	on	152		8	on				8	333	
	36	169			31	174						
2 1300-Along Cross Result										13	S	
2 1900-Along Cross Result										1	off	
										13	156	
3 0100-Along Cross Result												
3 0700-Along Cross Result	22	S			38	S			26	S		
	11	off	152		4	off			29	S		
	24	133			38	154			2	off		
3 1300-Along Cross Result										29	156	
3 1900-Along Cross Result										23	S	
										2	off	
										23	155	
4 0100-Along Cross Result										18	S	
4 0700-Along Cross Result	41	S			29	S				2	on	
	10	off	140		4	off				28	162	
	42	146			29	151						
4 1300-Along Cross Result									64	S		
4 1900-Along Cross Result												
5 0100-Along Cross Result										14	S	
5 0700-Along Cross Result	23	S			34	S				2	on	
	3	off	140		8	off				14	168	
	23	151			35	146						
5 1300-Along Cross Result										12	S	
5 1900-Along Cross Result										1	on	
										12	165	
										2	S	
										2	cn	
										3	205	
										3	N	
										4	on	
										5	287	
									38	S		
										4	S	
										2	on	
										4	187	
										6	S	
										1	off	
										6	151	
										5	S	
										0		
										5	160	

KEY = All speeds in CM/SEC
N = Northward, Shore parallel
S = Southward, Shore parallel
on = onshore off = offshore

TABLE 4: Current Data
JAN 1988

Day	Alongshore Cross-shore Resultant Time	Pier Measurements				Beach Measurements (500m Updrift)			Current Meter at South Tripod Depth -4.8m (NGVD) ID #679		
		Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed
6 0100-Along Cross Result											8
6 0700-Along Cross Result	41 0 41	S 160			55 14 57	S off 146			37 North	S	0 8 160
6 1300-Along Cross Result											14 3 14
6 1900-Along Cross Result											8 2 8 146
7 0100-Along Cross Result											15
7 0700-Along Cross Result	36 11 37	S on 177			61 0 61	S 160			67 North	S	1 15 18
7 1300-Along Cross Result											17 3 17
7 1900-Along Cross Result											3 0 3
8 0100-Along Cross Result											19 4 19
8 0700-Along Cross Result	55 3 55	S off 157			51 0 51	S 160			24 North	S	23 1 23
8 1300-Along Cross Result											15 9 17
8 1900-Along Cross Result											20 2 20 154
9 0100-Along Cross Result											26 3 26
9 0700-Along Cross Result	47 5 47	S on 166			44 4 44	S on 166			26 North	S	16 1 16
9 1300-Along Cross Result											22 2 22
9 1900-Along Cross Result											18 1 18 157
10 0100-Along Cross Result											18 1 18
10 0700-Along Cross Result	51 0 51	S 160			47 2 47	S off 157			33 North	S	19 2 19
10 1300-Along Cross Result											19 3 19
10 1900-Along Cross Result											16 2 16

KEY = All speeds in CM/SEC
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S = Southward, Shore parallel
on = onshore off = offshore

TABLE 4: Current Data
JAN 1988

Day	Time	Pier Measurements				Beach Measurements (500m Updrift)			Current Meter at South Tripod	
		Alongshore Cross-shore Resultant Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface) Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface) Location	Speed	Dir
11	0100-Along Cross Result								20	S
11	0700-Along Cross Result	28 7 29	S on 174		152	29 6 30	S off 149	33 North	8 2 8	S on 174
11	1300-Along Cross Result								9 1 9	S off 154
11	1900-Along Cross Result								24 2 24	S off 155
12	0100-Along Cross Result								25	S
12	0700-Along Cross Result	20 4 21	S on 171		152	61 21 65	N on 321	56 South	16 2 16	S off 153
12	1300-Along Cross Result								5 2 5	S off 138
12	1900-Along Cross Result								5 2 5	S off 138
13	0100-Along Cross Result								5 3 6	S off 129
13	0700-Along Cross Result	19 6 20	N off 357		152	87 4 87	N on 337	56 South	7 1 7	N off 348
13	1300-Along Cross Result								20 4 20	N on 329
13	1900-Along Cross Result								14 4 15	N on 324
14	0100-Along Cross Result								31 0 31	S
14	0700-Along Cross Result	87 30 92	S on 179		152	76 11 77	S on 169	101 North	69 8 69	S off 153
14	1300-Along Cross Result								41 3 41	S off 156
14	1900-Along Cross Result								24 2 24	S off 155
15	0100-Along Cross Result								12 1 12	S off 155
15	0700-Along Cross Result	41 8 41	S on 171		140	55 14 57	S off 146	49 North	21 1 21	S off 157
15	1300-Along Cross Result								26 1 26	S on 162
15	1900-Along Cross Result								31 0 31	S off 160

KEY = All speeds in CM/SEC
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on = onshore off = offshore

TABLE 4: Current Data
JAN 1988

Alongshore Cross-shore Resultant Time	Pier Measurements						Beach Measurements			Current Meter		
	Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	at South Tripod Depth -4.8m (NGVD) ID #679
Day												
16 0100-Along Cross Result										13	S	
16 0700-Along Cross Result	27 3 27	S off 154		17 37 41	S off 95			18	S	10	S	
16 1300-Along Cross Result								North		1	off	
16 1900-Along Cross Result										8	S	
17 0100-Along Cross Result										1	on	
17 0700-Along Cross Result	0 0 0			152	61 9 62	N off 349		3	N	4	153	
17 1300-Along Cross Result								South		2	off	
17 1900-Along Cross Result										6	326	
18 0100-Along Cross Result										9	N	
18 0700-Along Cross Result	23 7 24	N on 323		140	68 20 71	N on 323		6	N	1	on	
18 1300-Along Cross Result								South		3	off	
18 1900-Along Cross Result										3	52	
19 0100-Along Cross Result										9	S	
19 0700-Along Cross Result	9 4 4			140	51 18 54	N on 321		26	N	4	off	
19 1300-Along Cross Result								South		10	136	
19 1900-Along Cross Result										5	S	
20 0100-Along Cross Result										3	off	
20 0700-Along Cross Result	41 16 44	N off 2		140	61 0 61	N on 340		26	N	6	129	
20 1300-Along Cross Result								South		3	on	
20 1900-Along Cross Result										4	205	

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TABLE 4: Current Data
JAN 1988

Day	Alongshore Cross-shore Resultant Time	Pier Measurements				Beach Measurements (500m Updrift)			Current Meter at South Tripod			
		Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir
21	0100-Along Cross Result										8	S
21	0700-Along Cross Result	14	N			12	N		1	N	0	
21	0700-Along Cross Result	4	off		140	0				South	4	N
21	0700-Along Cross Result	14	357			12	340				1	off
21	1300-Along Cross Result										4	354
21	1900-Along Cross Result										3	S
21	1900-Along Cross Result										7	off
21	1900-Along Cross Result										8	93
22	0100-Along Cross Result										7	S
22	0700-Along Cross Result	30	S			55	S		58	S	2	off
22	0700-Along Cross Result	9	on		152	0				North	22	155
22	0700-Along Cross Result	32	177			55	160				16	S
22	1300-Along Cross Result										1	off
22	1300-Along Cross Result										16	156
22	1900-Along Cross Result										24	S
22	1900-Along Cross Result										2	off
22	1900-Along Cross Result										24	155
23	0100-Along Cross Result										8	S
23	0700-Along Cross Result	19	N			28	N		21	S	1	on
23	0700-Along Cross Result	2	off		140	3	off			South	7	168
23	0700-Along Cross Result	19	346			28	346				10	303
23	1300-Along Cross Result										7	S
23	1300-Along Cross Result										1	off
23	1900-Along Cross Result										7	152
23	1900-Along Cross Result										4	S
23	1900-Along Cross Result										3	off
23	1900-Along Cross Result										5	123
24	0100-Along Cross Result										5	S
24	0700-Along Cross Result	14	N			36	N		8	N	3	on
24	0700-Along Cross Result	2	off		140	4	off			South	2	on
24	0700-Along Cross Result	14	349			36	346				4	306
24	1300-Along Cross Result										1	N
24	1300-Along Cross Result										2	on
24	1300-Along Cross Result										2	277
24	1900-Along Cross Result										7	N
24	1900-Along Cross Result										5	on
24	1900-Along Cross Result										9	304
25	0100-Along Cross Result										3	N
25	0700-Along Cross Result	15	N			4	N		7	N	1	off
25	0700-Along Cross Result	2	on		152	2	off			South	3	358
25	0700-Along Cross Result	15	331			5	4				2	N
25	1300-Along Cross Result										0	
25	1300-Along Cross Result										2	340
25	1300-Along Cross Result										7	N
25	1900-Along Cross Result										9	off
25	1900-Along Cross Result										11	32
25	1900-Along Cross Result										1	N
25	1900-Along Cross Result										1	off
25	1900-Along Cross Result										1	25

KEY = All speeds in CM/SEC

N = Northward, Shore parallel

S = Southward, Shore parallel

on = onshore off = offshore

TABLE 4: Current Data
JAN 1988

Alongshore Cross-shore Resultant Time	Pier Measurements				Beach Measurements (500m Updrift)				Current Meter at South Tripod		
	Dye at (579 m) (surface)	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	Depth -4.8m (NGVD)	ID #679
Day	Speed	Dir								Speed	Dir
26 0100-Along Cross Result										2	S
26 0700-Along Cross Result	17 8 19	S off 136	152	29 12 31	N off 2	11	N			3	on
26 1300-Along Cross Result										4	216
26 1900-Along Cross Result										5	N
27 0100-Along Cross Result										6	on
27 0700-Along Cross Result	8 4 9	S off 133	152	25 8 27	S off 143	3	S			10	289
27 1300-Along Cross Result										2	171
27 1900-Along Cross Result										5	S
28 0100-Along Cross Result										5	off
28 0700-Along Cross Result	12 5 13	S off 138	152	16 7 18	S off 138	27	N			7	115
28 1300-Along Cross Result										6	101
28 1900-Along Cross Result										3	340
29 0100-Along Cross Result										5	N
29 0700-Along Cross Result	18 3 18	S on 169	152	15 2 15	S on 169	North				1	on
29 1300-Along Cross Result										1	250
29 1900-Along Cross Result										7	152
30 0100-Along Cross Result										6	S
30 0700-Along Cross Result	14 6 15	N off 2	152	10 6 11	N off 11	27	North			0	160
30 1300-Along Cross Result										1	S
30 1900-Along Cross Result										2	on
										3	205
										7	off
										2	144
										19	S
										4	off
										19	148
										8	S
										5	off
										9	128
										1	N
										4	on
										4	236
										3	N
										4	on
										5	287
										8	N
										5	on
										9	308
										4	N
										3	on
										5	303

KEY = All speeds in CM/SEC
N = Northward, Shore parallel
S = Southward, Shore parallel
on = onshore off = offshore

TABLE 4: Current Data
JAN 1988

Alongshore Cross-shore Resultant ---- Time Day	Pier Measurements				Beach Measurements (500m Updrift)				Current Meter at South Tripod Depth -4.8m (NGVD) ID #679	
	Dye at (579 m) (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	Speed	Dir
31 0100-Along Cross Result									6	N
31 0700-Along Cross Result	20 3 21	N off 349		152	10 1 10	N off 349		12	N	4 7 5 3 6
31 1300-Along Cross Result										7 4 8
31 1900-Along Cross Result										3 3 4

KEY = All speeds in CM/SEC
N = Northward, Shore parallel
S = Southward, Shore parallel
on = onshore off = offshore

PART V: SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves but not surface chop or capillary waves). The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring the alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is orientated 70 deg east of true north; consequently, wave angles greater than 70 deg indicate that the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about 0.3 m into the water and allowed to remain for at least one minute. The jar is removed, the temperature read, and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

TABLE 5: Supplemental Observations

JAN 1988

DAY	TIME	WAVE APPROACH ANGLE AT PIER END		RADAR WAVE ANGLE deg from True N	WIDTH OF SURF ZONE,m	WATER CHARACTERISTICS AT PIER END		
		deg from True N Primary	Secondary			TEMP, C	DENSITY g/cc	SECCI VIS,m
1	1025	105			82	8.6	1.0234	0.6
2	1040	45		60	122	8.1	1.0240	0.3
3	1030	65		70	110	7.2	1.0238	0.3
7	2004	90	50	70	67	6.1	1.0210	0.9
5	750	40			43	6.7	1.0228	1.2
6	805	30			73	5.0	1.0228	0.9
7	825	40			94	3.4	1.0232	0.9
8	817	80	40		338	4.5	1.0220	0.3
9	935	60	25	70	79	3.4	1.0208	0.6
10	1016	45	70	60	134	3.4	1.0204	0.6
11	730	45	90	60	168	4.5	1.0216	0.3
12	745	60	40		213	3.9	1.0232	0.3
13	740	110	60		104	4.2	1.0233	0.6
14	830	30		50	347	3.6	1.0242	0.3
15	750	35		60	171	2.8	1.0242	0.6
16	950	60	45	60	107	1.7	1.0204	0.9
17	910	95	65		154	2.2	1.0206	1.5
18	900	90			128	4.5	1.0220	0.9
19	735	100	40	90	79	4.5	1.0224	1.5
20	745	100			76	5.0	1.0232	2.7
21	805	110	70		2	6.2	1.0242	1.2
22	745	40	70	50	55	4.5	1.0220	1.5
23	800	70			37	4.5	1.0216	1.5
24	930	100			17	4.7	1.0218	3.0
25	735	none visible			52	4.5	1.0232	2.7
26	815	100			50	4.5	1.0230	2.1
27	825	30			47	3.9	1.0234	3.7
28	906	10			38	3.4	1.0232	3.0
29	830	38		50	43	4.5	1.0236	2.7
30	735	70			31	4.5	1.0231	2.1
31	731	110			5	5.6	1.0240	2.4

PART VI: WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours) and contains a list of selected mean and extreme values. This presentation is useful in identifying effects of both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

FRF TIDE HEIGHTS

JAN 1988

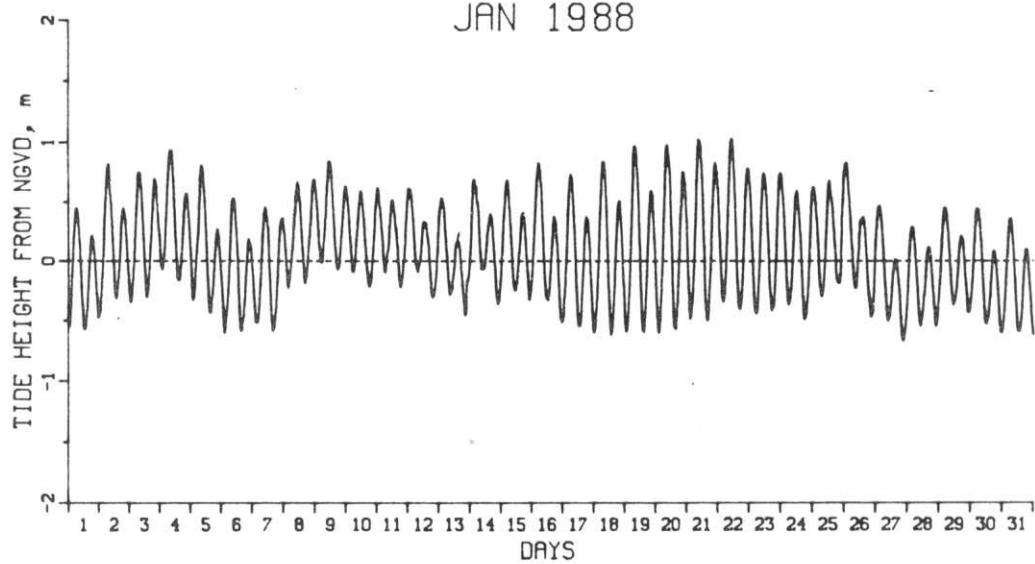


FIGURE 4. Time History of Mean Water Levels

MONTHLY WATER LEVELS (METERS NGVD)

EXTREME LOW = -0.67 ON DAY 27 AT 2030HRS.
EXTREME HIGH = 1.03 ON DAY 22 AT 1012HRS.
MONTHLY MEAN = 0.09
MEAN LOW = -0.40
MEAN HIGH = 0.56
MEAN RANGE = 0.96

Table 6: WATER LEVELS, METERS NGVD

		JAN 1988			
MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-0.57	0.45	-0.05	1.02
1	1837	-0.56	0.21	-0.18	0.77
2	703	-0.32	0.82	0.26	1.14
2	1928	-0.35	0.45	0.04	0.80
3	753	-0.30	0.75	0.25	1.06
3	2018	-0.21	0.69	0.26	0.90
4	843	-0.16	0.93	0.42	1.09
4	2109	-0.33	0.57	0.14	0.90
5	934	-0.43	0.81	0.22	1.24
5	2159	-0.60	0.27	-0.15	0.87
6	1024	-0.58	0.53	0.00	1.11
6	2249	-0.52	0.19	-0.19	0.70
7	1115	-0.58	0.45	-0.05	1.04
7	2340	-0.42	0.36	0.04	0.78
8	1205	-0.18	0.66	0.23	0.85
9	30	-0.02	0.69	0.32	0.70
9	1255	-0.07	0.84	0.37	0.91
10	121	-0.09	0.63	0.26	0.73
10	1346	-0.22	0.59	0.18	0.81
11	211	-0.10	0.62	0.25	0.72
11	1436	-0.22	0.52	0.16	0.73
12	301	-0.09	0.61	0.26	0.70
12	1527	-0.30	0.33	0.03	0.63
13	352	-0.28	0.53	0.14	0.81
13	1617	-0.45	0.17	-0.09	0.62
14	442	-0.12	0.69	0.27	0.80
14	1707	-0.36	0.40	0.04	0.76
15	532	-0.25	0.68	0.21	0.93
15	1758	-0.33	0.41	0.04	0.73
16	623	-0.33	0.82	0.27	1.15
16	1848	-0.51	0.38	-0.08	0.89
17	713	-0.54	0.73	0.11	1.27
17	1938	-0.59	0.37	-0.11	0.97
18	804	-0.62	0.83	0.16	1.45
18	2029	-0.59	0.51	-0.06	1.09
19	854	-0.59	0.97	0.22	1.56
19	2119	-0.60	0.59	0.00	1.19
20	944	-0.57	0.98	0.22	1.54
20	2210	-0.48	0.75	0.12	1.23
21	1035	-0.49	1.02	0.30	1.52
21	2300	-0.34	0.83	0.22	1.17
22	1125	-0.40	1.03	0.31	1.43
22	2350	-0.44	0.78	0.17	1.22
23	1216	-0.41	0.74	0.15	1.15
24	41	-0.37	0.74	0.19	1.11
24	1306	-0.49	0.59	0.05	1.08
25	131	-0.34	0.62	0.14	0.96
25	1356	-0.19	0.68	0.20	0.86
26	222	-0.23	0.83	0.33	1.06
26	1447	-0.47	0.37	0.01	0.84
27	312	-0.50	0.47	0.03	0.97
27	1537	-0.67	0.02	-0.30	0.69
28	402	-0.58	0.29	-0.12	0.86
28	1628	-0.55	0.12	-0.21	0.66
29	453	-0.43	0.45	0.05	0.88
29	1718	-0.43	0.21	-0.12	0.65
30	543	-0.53	0.45	0.01	0.97
30	1808	-0.60	0.09	-0.27	0.69
31	634	-0.59	0.36	-0.10	0.95
31	1859	-0.62	0.10	-0.25	0.72

PART VII: NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 5 shows the last survey in December 1987 and the two surveys in January 1988 on profile line 188, located 517 m south of the pier. The most dramatic changes occurred on the nearshore bar (140 to 250 m) which almost doubled in size and migrated 50 m shoreward. At the same time, a significant amount of erosion caused a steepening of the foreshore below NGVD (100 to 140 m).

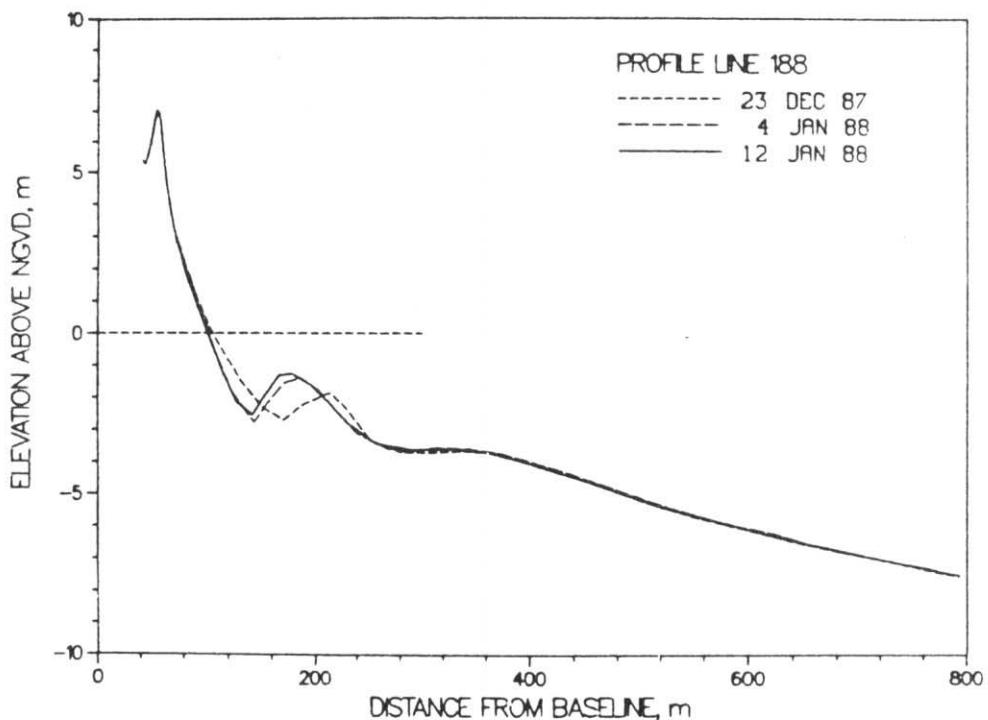


Figure 5. Monthly CRAB profiles on profile 188 - 517 m south of pier.

The profile envelope (Figure 6) reflects the maximum changes that occurred on the profile since the end of 1987.

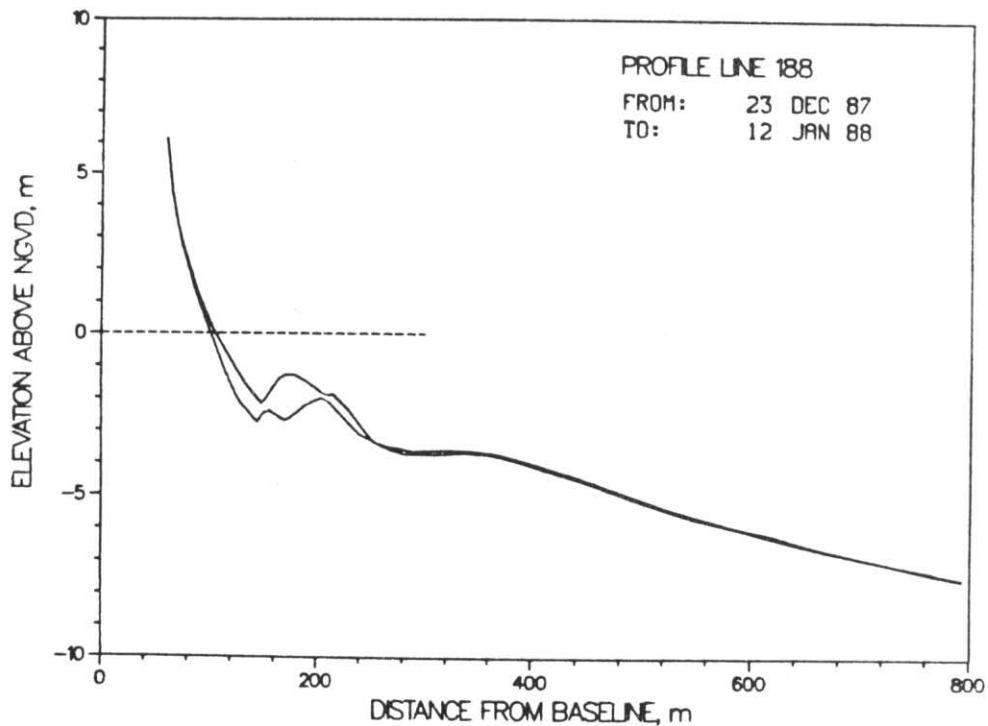


Figure 6. CRAB profile envelope - profile 188.

B. Bathymetry. No bathymetric survey was conducted in January. The December bathymetry (Figure 7) is given for reference.

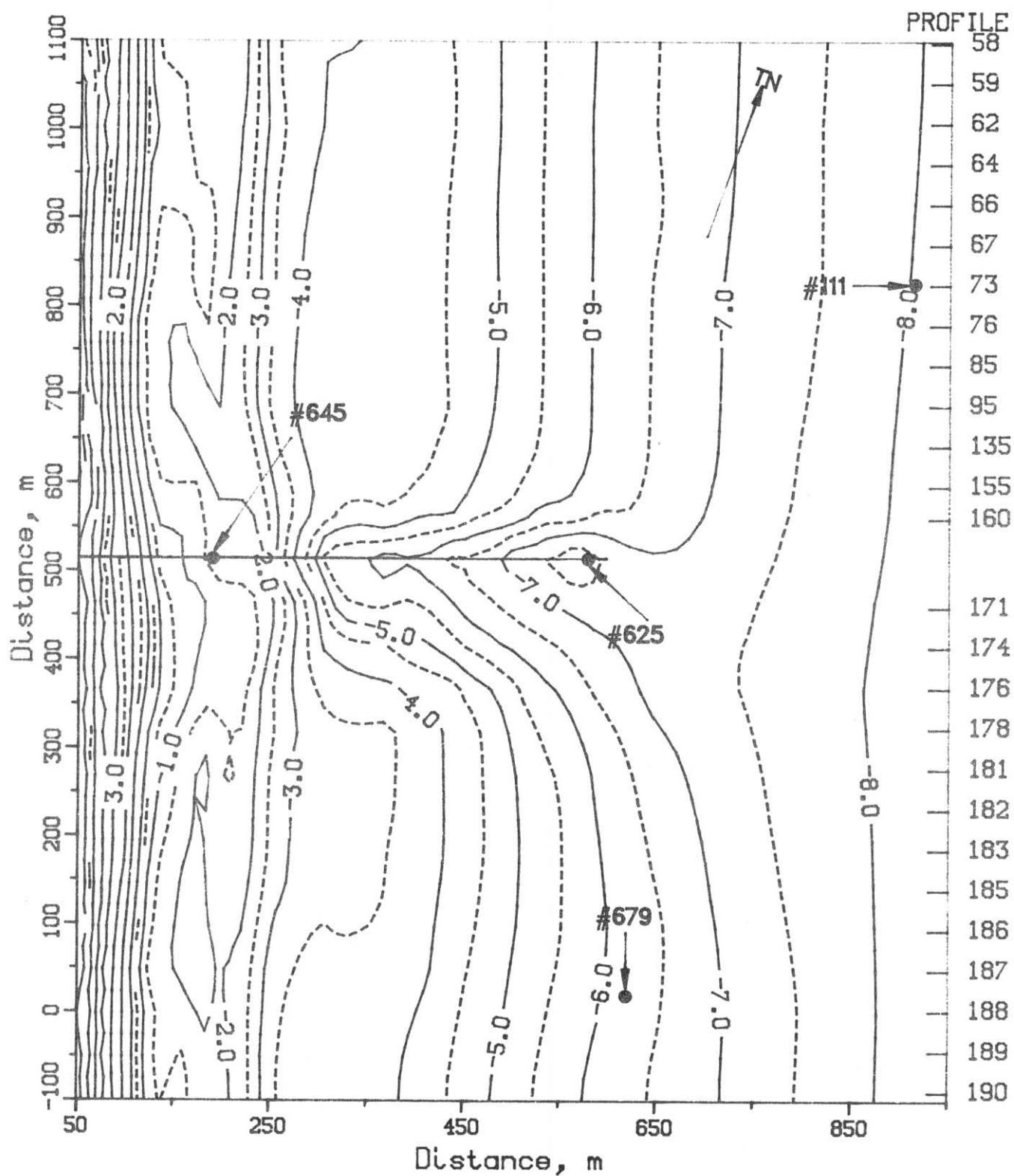


Figure 7. FRF BATHYMETRY 9 DEC 87
 CONTOURS IN METERS

PART VIII: SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by Gage 625 at pier station 19+00) exceeded 2 m. When this occurred, four contiguous 34-min wave records were obtained every three hours:

<u>Start</u>	<u>End</u>
3 Jan (2008)	3 Jan (2342)
7 Jan (2342)	8 Jan (1108)
14 Jan (0400)	14 Jan (1408)

B. Storm Synopsis.

3 January - Early on 2 January, strong onshore winds (from north-northeast) generated by a high pressure system centered over Illinois began to affect the FRF. Late on 3 January, the maximum wind speeds exceeded 14 m/s and the maximum H_{mo} of 2.19 m ($T_p = 6.56$ sec) was recorded. Precipitation totalled 27 mm.

7-8 January - Onshore winds, generated by a Canadian high pressure system, were reinforced by the formation of a storm off the NC coast late on 7 January. The storm moved rapidly up the coast and reached Maine by 9 January. Peak winds (from northeast) exceeded 16 m/s at 0242 hr on 8 January. Several hours later, the maximum H_{mo} of 2.84 ($T_p = 7.31$ sec) and minimum barometric pressure of 1011.3 mb were recorded. Precipitation totalled 25 mm.

14 January - Again, a strong high pressure system centered over Illinois produced strong onshore winds (from northeast) at the FRF beginning late on 13 January and continuing through the 14th. The maximum wind speed (exceeding 17 m/s) and the maximum H_{mo} of 2.49 ($T_p = 7.11$ sec) were both recorded at 0700 hr on the 14th.

Distribution List

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